

CLAIMS

1. A method of producing a nanomaterial comprising forming a mold by a lithographic method on a solid substrate, forming a metal oxide thin film or an organic/metal oxide composite thin film on the formed mold, and removing the formed mold to form a metal oxide nanostructural body or an organic/metal oxide composite nanostructural body.

2. A method of producing a nanomaterial comprising forming a mold on a solid substrate by a lithographic method, forming a polymeric thin film on the formed mold, forming a metal oxide thin film or an organic/metal oxide composite thin film on the formed polymeric thin film, and removing the formed polymeric thin film or the mold and the polymeric thin film thereby forming a metal oxide nanostructural body or an organic/metal oxide composite nanostructural body.

3. The production method according to Claim 1 or 2 comprising removing a portion corresponding to an organic compound contained in the organic/metal oxide composite thin film.

4. The production method according to Claim 1 or 2 comprising separating the solid substrate or the solid substrate and the mold, and the metal oxide nanostructural body or the organic/metal oxide composite nanostructural body.

5. The production method according to Claim 3, comprising separating the solid substrate or the solid substrate and the mold, and a structural body removed with a portion corresponding to the organic compound contained in the organic/metal oxide composite thin film.

6. The production method according to any one of Claims 1 to 5, comprising covering at least a portion of the metal oxide nanostructural body, the organic/metal oxide composite nanostructural body, or the structural body removed with a portion corresponding to the organic compound contained in the organic/metal oxide composite thin film.

7. The production method according to any one of Claims 1 to 6 wherein, the following processes are conducted at least once during the formation of the metal oxide thin film or the organic/metal oxide composite thin film:

5 (a) bringing a metal compound or a combination of an organic compound and a metal compound into contact with the forming surface, the metal compound and the combination of an organic compound and a metal compound having groups capable of conducting condensing reaction with hydroxyl groups or carboxyl groups which
10 are present at or introduced in the forming surface and forming hydroxyl groups by hydrolysis, and

(b) hydrolyzing the metal compound present at the forming surface to obtain a metal oxide.

8. The method according to any one of Claims 1 to 7, wherein
15 a mold comprising an organic compound is used as the mold.

9. The method according to any one of Claims 1 to 8, wherein removal of the mold, the polymeric thin film and/or the organic compound contained in the organic/metal oxide composite thin film is conducted by at least one of treating methods selected
20 from plasma, ozone oxidation, leaching and baking.

10. A nanomaterial having a structure removed with a portion corresponding to a mold from a structural body in which a mold, a metal oxide thin film, or an organic/metal oxide composite thin film are formed in this order on a solid substrate.

25 11. A nanomaterial having a structure in which a portion corresponding to a polymeric thin film or a mold and the polymeric thin film is removed from a structural body in which the mold, the polymeric thin film, and a metal oxide thin film or an organic/metal oxide composite thin film are formed in this order
30 on a solid substrate.

12. The nanomaterial according to Claim 10 or 11, having a structure removed with a portion corresponding to an organic compound contained in the organic/metal oxide composite thin film.

13. The nanomaterial according to Claim 10 or 12, having a structure in which the solid substrate is separated.

14. The nanomaterial according to Claim 11 or 12 having a structure in which the solid substrate and the mold are separated.

15. The nanomaterial according to Claim 13 or 14 having a structure in which at least a portion of the metal oxide nanostructural body, the organic/metal oxide composite nanostructural body, or a structural body removed with a portion corresponding to an organic compound contained in the organic/metal oxide composite thin film is removed is covered with an organic compound layer.

16. The nanomaterial according to any one of Claims 10 to 15, wherein removal of mold, the polymeric thin film and/or the portion corresponding to the organic compound contained in the organic/metal oxide composite thin film is conducted by at least one of treatments selected from the group consisting of plasma, ozone oxidation, leaching and baking.

17. A nanomaterial obtained by the method according to any one of Claims 1 to 9.

18. A nanomaterial according to any one of Claims 10 to 17, having self-sustainability.